DOCUMENT RESUME

ED 395 563 IR 017 875

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TITLE Distance Education in the Pacific Northwest: Program Benefits and Implementation Barriers.
PUB DATE Apr 96
NOTE 18p.; Paper presented at the Annual Conference of the American Educational Research Association (New York, NY, April 8-12, 1996).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Communications Satellites; *Distance Education; *Electronic Classrooms; Pacific Americans; Program Effectiveness; *Regional Programs; Resource Allocation; *School Surveys; Secondary Education; Telecommunications
IDENTIFIERS *Barriers to Implementation; *Pacific Northwest; Star Schools; Teleclasses; Washington (Spokane)

ABSTRACT

In 1990, the Satellite Telecommunications Educational Programming (STEP) Network in Spokane (Washington) joined with state education agencies from Alaska, Idaho, Montana, Oregon, and Washington to form the Pacific Northwest Star Schools partnership for distance education. The STEP network offers telecast courses to 500 schools, 90% of which are in rural areas. Of the 6,000 middle- and high-school STEP/Star students in those 500 schools, 72% were in grades 9 through 12, 57% were female, and 26% were Native American. Courses range from languages like Spanish and Japanese to marine science and astronautics. A 1994 survey polled 440 superintendents and building administrators. Forty-three percent of respondents indicated that their buildings had participated in the STEP/Star program for two to three years, and 53% anticipated increasing the use of distance learning at their locales over the next five years. The survey also shed light on the perceived benefits of distance learning and on barriers to technology implementation, such as a lack of equipment, scheduling, cost, instructional concerns, and lack of technical assistance. Commitment of time and resources at various organizational levels was seen as a crucial factor in further progress. (Contains 5 figures, 3 tables, and 26 references.) (BEW)

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IR017875

A paper presented at the annual meeting of the American Educational Research Association, New York City, April 8-12, 1996

Distance Education in the Pacific Northwest: Program Benefits and Implementation Barriers

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The STEP/Star Program

The Satellite Telecommunications Educational Programming (STEP) network—a division of Educational Service District 101 in Spokane, Washington—was developed to provide equal learning opportunities for all students regardless of geographic location or educational resources. In 1990, STEP joined with state education agencies from Alaska, Idaho, Montana, Oregon, and Washington to form the Pacific Northwest Star Schools partnership to provide distance education services to the five-state region. It has become a three-time award winner under the federal Star Schools program administered by the U.S. Department of Education.

Using federal funds, STEP enhances and expands distance learning in a region connected by culture and economy. The program offers telecast courses on a wide range of topics including foreign languages, mathematics, and science in support of federal policy initiatives (National Education Goals Panel, 1993; U.S. Department of Labor, 1992; U.S. Department of Education, 1991). Distance education is provided to approximately 500 schools serving some 6,000 students in middle and high school grades in the five states. In addition to student services, the program also provides professional development activities to teachers and school administrators.

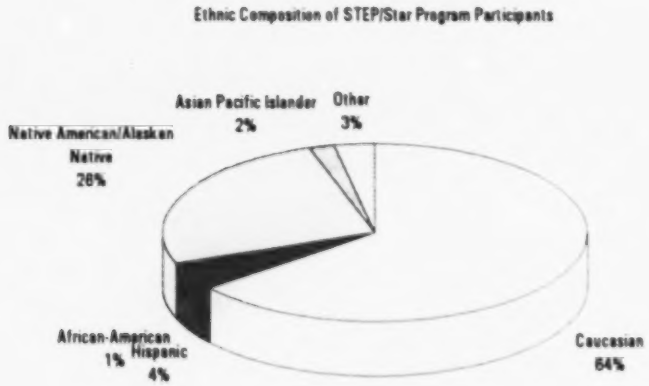
Participating schools receive start-up equipment (e.g., satellite dishes, computers, modems, and scanners) through federal funding. Technical assistance is provided by the STEP/Star Program as well as the respective states in installing and maintaining the equipment. Upon paying a membership fee, the schools may select from a wide array of offerings any telecast courses and inservice activities which they deem most appropriate for their students and school staff. A predominant majority (90%) of the participating schools are located in rural areas. The average program site is approximately 80 miles from the nearest university or college.

Program Participants

A survey conducted in 1994 indicated that a predominant majority (72%) of the STEP/Star students were in the high school grades (i.e., grades 9 through 12). There were slightly more female students (57%) than male students (43%). As shown in Figure 1, a majority (64%) of the students were Caucasian. More than one-fourth (26%)

were Native American/Alaska Native. (In Alaska, more than two-thirds of the STEP/Star participants were Native American/Alaska Native.)

Figure 1



A predominant majority (82%) of the students attended schools located in rural areas. STEP/Star participants included students in Chapter 1 (5%), special education (3%), and migrant programs (6%). Another four percent were students with limited English proficiency. Less than one percent were disabled students. See Figures 2 and 3.

Figure 2

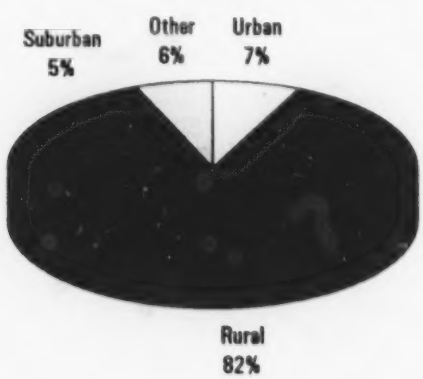
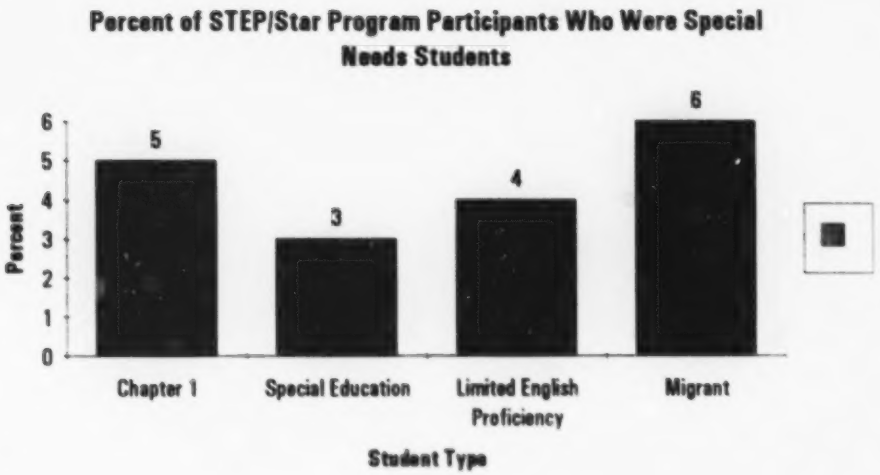


Figure 3



Course Enrollment

The most popular telecast courses included Spanish I (21%), Japanese I (20%), and Young Astronauts (17%). Table 1 presents a summary of courses which the students were taking when the survey was conducted.

Table 1

Summary of Course Enrollments

Course	% of Students
Spanish I	21
Japanese I	20
Young Astronauts	17
Japanese II	11
Spanish II	9
Advanced Senior English	6
Career Paths	6
Environmental Science	4
Russian I	4
High School Marine Science	3
Russian	3
Middle School Science and Technology	2
English as a Second Language	1

Reasons for Participation

Close to one-half (49%) of the students indicated that they took the STEP/Star courses because the courses were not offered in the regular school program. Forty percent said they took the courses as part of college preparation. Reasons for taking STEP/Star courses are summarized in Table 2.

Table 2

Reasons for Taking STEP/Star Courses

Reason	% of Students
Courses not offered in the regular school curriculum	49
College preparation	40
Interest in topics covered by the telecast course(s)	25
Need to take course for high school graduation	24
Instructional methods used in the telecast course(s)	23
Interest in distance learning	20
Quality of the teacher	9
Was told to take the course	4

The Study

Since the inception of STEP/Star in 1990, formative and summative evaluation activities have been conducted on an ongoing basis to assess program implementation and its impact on participating schools. Evaluation activities have included questionnaire surveys, focus group meetings, case studies, and performance assessments of student outcomes.

In 1994, a survey was conducted with local administrators to assess client needs with respect to distance learning and to obtain client perceptions on program processes and outcomes. A total of 440 superintendents and building administrators of STEP/Star program sites in the five-state region participated in the survey, representing a response rate of 90 percent. This paper presents findings obtained from that survey on program benefits and major barriers to program implementation as perceived by the local administrators.

The Respondents

A large proportion (43%) of the respondents indicated that their schools or districts had participated in the STEP/Star Schools Program for two to three years. Twenty-nine percent indicated that they had been with the program for less than two years. The remainder (28%) reported participation of more than three years.

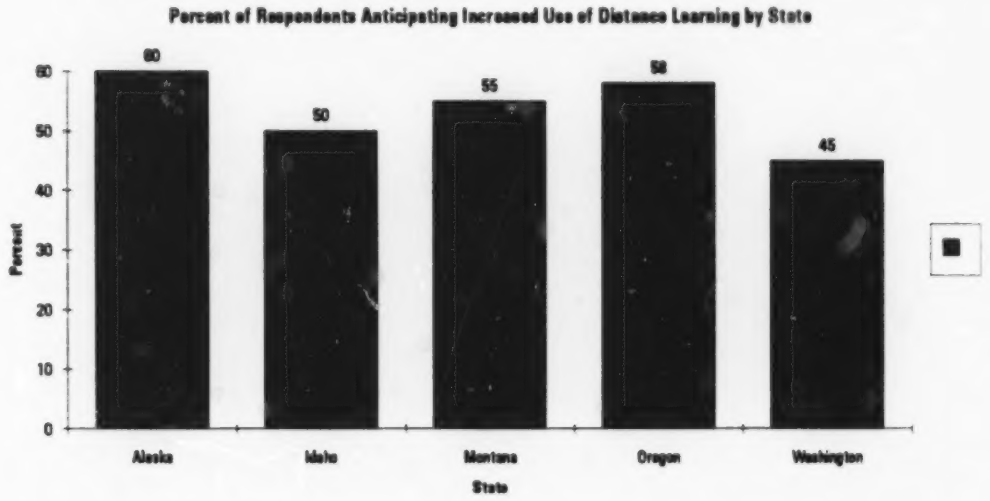
A predominant majority (90%) of the respondents indicated that their schools or districts were located in rural areas. The average Star Schools site was approximately 80 miles from the nearest university or college.

A majority (62%-78%) of the respondents reported that STEP/Star Schools courses were offered at grades 9 through 12. Other grade levels receiving instruction from the program included:

Grade 8	27%
Grade 7	26%
Grade 6	22%
Grade 5	14%

More than one-half (53%) of the respondents reported that they anticipated increasing the use of distance learning in their schools or districts over the next five years. A breakdown by state is shown in Figure 4.

Figure 4



Program Benefits

Desired Outcomes

The respondents were asked to rate the importance of various outcomes of distance learning on a scale of *priority, very important, important, somewhat important,* and *not important*. A large majority of the respondents provided high ratings (i.e., *important,*

very important, or *priority*) for a wide array of outcomes, as shown in Table 3 and Figure 5.

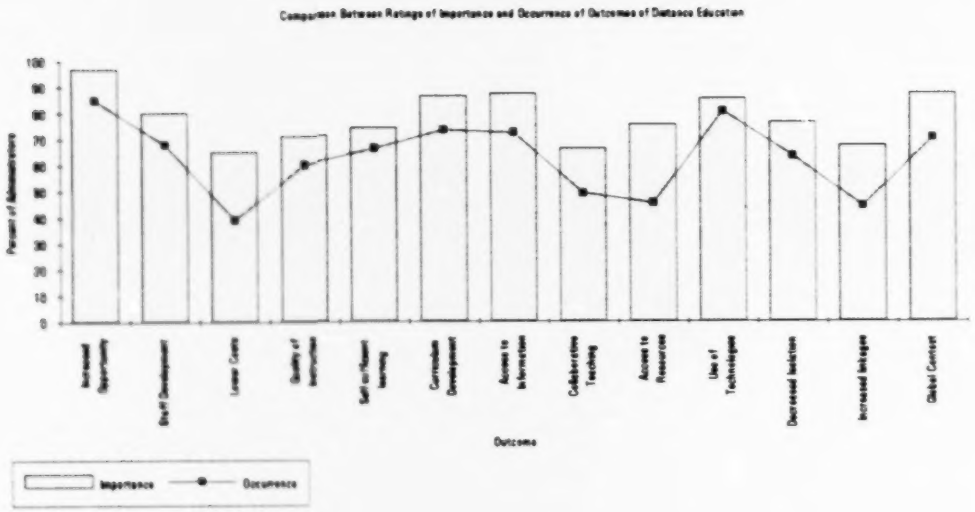
The respondents were also asked to rate the extent to which the various outcomes were occurring in their schools or districts. On a five-point scale ranging from "great extent" to "not at all," a majority of the respondents provided favorable ratings (i.e., ratings of 3 or higher) on most of the outcomes, as shown in Table 3.

Table 3

Ratings by Respondents on Importance and Occurrence of Outcomes of Distance Education

Outcome	% of respondents providing high ratings on importance	% of respondents providing favorable ratings on occurrence
Increased opportunities for students	97%	85%
Increased staff development opportunities	80%	68%
Lower instructional costs	65%	39%
Improved quality of instruction	71%	60%
Self-sufficient learning	74%	66%
Enhancement of curriculum development	86%	73%
Timely access to unattainable information	87%	72%
Interdisciplinary and collaborative teaching	66%	49%
Access to resources	75%	45%
Use of new technologies	85%	80%
Decreased sense of isolation	76%	63%
Increased community/school linkages	67%	44%
Providing a global context	87%	70%

Figure 5



Unanticipated Outcomes

Some of the benefits were unanticipated. For example, the local administrators indicated that some of the regular classroom teachers have become better instructors as a result of watching the studio teachers, particularly with respect to teaching interdisciplinary courses. Through inservice offerings, they have become better informed about curriculum and instruction. The program has provided teachers the opportunity to continue to improve their teaching skills.

In some cases, the spin-off effects on small rural communities have been great. Having greater access to education via satellite, families are now staying where they want to be and rural communities are being strengthened. As one respondent from a rural district put it:

> *Our community worked hard to get this. We were seeing a tremendous dropout rate from 6th to 8th grade. Now they can stay here and the rate is much better. This is a great blessing to the community. There will be spin-off benefits down the road. The reason why STEP/Star went over well here is that there was a real need.*

Implementation Barriers

In open-ended comments, the local administrators identified a number of conditions which have impeded the implementation of distance learning programs in their schools or districts.

Equipment and Support

Several administrators indicated that a lack of equipment and local support for distance education has impeded implementation. Specific examples included:

- Lack of distance learning equipment in the classrooms
- Lack of standardized equipment for interconnects
- Lack of local/state administrative support
- Lack of "last mile" technology to connect rural schoolrooms to the distance learning infrastructure
- Lack of support from school level staff
- Burden of government regulations
- Lack of parent/community support

In some cases, equipment problems have detracted from program effectiveness. Poor reception, busy phone lines, and nonfunctioning hardware have led to frustration and even cancellation of classes.

Scheduling

Time differences within the region have continued to make scheduling difficult. For example, in Alaska, some satellite classes are offered before the instructional day begins.

While most respondents realize that scheduling will probably always remain a problem for some states, many point out that block schedules are increasingly prevalent at participating schools. The 90-minute block schedule leaves a significant portion of the class time uncovered by the broadcast.

Broadcasting on the hour is a detriment to many schools which begin their classes on the half-hour. Scheduling conflicts have forced some schools to tape all or parts of the telecast for later viewing, reducing the opportunity for live interaction with the studio teacher.

Some respondents suggested that the more popular classes be offered twice daily to alleviate scheduling problems and that STEP/Star consider developing course offerings that fit block schedules.

Program Costs

To many districts, small rural districts in particular, program costs are high. Many administrators would like to see a reduction in enrollment fees to make course offerings more affordable. As one rural administrator put it:

> *It is very expensive for us, the small districts. Yet, we are the ones that need the program the most because of limited staff certification and experience.*

Many believed that small schools would be more involved if cost was reduced. Some suggested a fee structure based on a sliding scale contingent upon district size.

Instructional Concerns

Several instructional challenges were identified by the local administrators, including the following:

- Student motivation
- Interactivity
- Program staffing
- Other pedagogical concerns

There is a perception among administrators that students who are self-motivated and independent tend to benefit more from the STEP/Star course offerings. The administrators believe that the STEP/Star courses are very effective with self-motivated and self-disciplined students. In their view, the satellite courses are excellent for students who can work independently. As one administrator put it:

> *Our ability to use Star Schools effectively has increased as more students develop the ability to work independently—a must with Star Schools.*

Another saw it this way:

> *Students who are interested and motivated are challenged, enjoy the additional instruction, and do well. Students without intrinsic motivation...tend to fall through the cracks.*

There is a widespread belief that the ability to interact with the studio teacher and staff has a beneficial effect on student learning. In general, the administrators believe that live broadcasts are more effective than taped versions because the former affords the opportunity to interact with the studio teacher. As one administrator said:

> *We have not been taking the course live. The tape delay may be partly responsible, but the kids call it boring.*

Another shared the same perception:

> *Even with evening tutors, students feel that they are on their own. Much of this is due to our not being live because of our regular school schedule.*

Technical Assistance

The respondents cited a range of areas in which training and technical assistance would be needed for effective program implementation, including:

- Scheduling courses
- Resource development/funding
- Student motivation
- Data transmission equipment
- Program planning/development
- Downlink receive equipment
- Classroom management
- Program policy development
- Student selection

Some administrators feel that onsite staff's inability to use equipment properly remains an obstacle to effective implementation. They would like to see improved (more immediate and onsite) technical help with equipment use.

Others believe that classroom coordinators should receive training in effective classroom techniques, management, and organization. With staff turnover, some respondents feel that ongoing training should be provided in all aspects of STEP/Star services.

At the studio, camera presence techniques should be taught to presenters. Students are easily turned off if presenters cannot project an immediate relationship with them through the medium. Some respondents see a need to "jazz up the classes" because the program is competing in a high-tech, MTV environment.

Discussion

Facilitators

Extant literature on the implementation of distance education programs has been relatively scant. Much of the research has consisted of evaluation studies of various distance education programs. While these studies are typically qualitative, they have identified the following conditions as facilitators of effective implementation of distance education programs.

Clearly identified needs. Distance education should address clearly identified needs for the school or district. The literature suggests that this is one of the most important prerequisites to the success of a distance education system. Distance education can satisfy a variety of needs. Examples include:

- Provide instruction in a subject area for which expertise does not exist among current school staff
- Provide instruction in a subject area for which a teacher cannot be hired
- Bring a different perspective or experiences to students from places not easily accessible
- Add current information to the curriculum
- Accommodate learning styles
- Offer instructional opportunities to students needing flexibility in time and location
- Comply with state mandates

The needs identification process should include the school staff. Involving them early in the decisionmaking process will increase teacher support for distance education programs. The identified needs should drive distance education technologies (Bond, 1987; Bramble, 1990; Pease & Tinsley, 1986).

Commitment of resources. Distance education requires a commitment of resources in terms of expenditure for equipment, time, new staff, and facilities (Bramble, 1990; Holznagel, 1990; Holznagel, 1991; Kitchen & Kitchen, 1988; Lenk & Drexler, 1992; Willis, et al., 1985). To be successful, distance education projects require initial capital expenditures for hardware and software. License fees, updating costs for new software, and ongoing operational costs are needed to sustain distance education. In addition, costs of new software (e.g., purchasing, upgrading, and staff training) as well as costs for repairs and maintenance of equipment should be considered.

New staff with technical expertise might need to be hired. As new technologies are integrated into an existing system, costs for additional technical staff or re-training of existing staff will be necessary. Also, program implementation may require changes in the physical facilities at the school site.

School staff commitment. Positive attitudes towards technology and knowledge about distance education facilitate successful implementation of distance education programs (Charles, 1989; Drexler, 1992; Holznagel, 1991; Lenk & Drexler, 1992; Loucks-Horsley, 1989; Moore, et al., 1990). Research suggests that teachers with some experience with technology is a salient condition which accompanies change. Also, teachers need to believe that distance education will have positive benefits. A positive climate in which teachers have already built collaborative relationships with other teachers will promote successful program implementation. The literature indicates that gaining commitment from teachers, keeping the staff involved in the planning and implementation processes, and providing training to staff are crucial.

Commitment of school administration. Research indicates that the school administrator should have some knowledge about and experience with distance education. The administrator should be proactive towards implementation and dissemination of distance education programs and be willing to commit resources for staff development. There should be a long-range plan which includes distance education as part of school

improvement. School leaders should encourage the involvement of school staff in the decisionmaking process for need identification, planning, and implementation (Drexler, 1992, Holznagel, 1991; Lenk & Drexler, 1992; Willis, et al., 1985).

Alignment of the distance education program with the regular school curriculum. Another important factor is how well the distance education program fits into the school curriculum and structure. Implementation plans should address how and where the distance education program and products fit into the existing school curriculum. The distance education program should share the same instructional goals with the regular school program. Instructional strategies, student activities, and materials should dovetail and be integrated with the regular school program (Barker, 1989; Batey & Cowell, 1986; Bond, 1987; Willis, 1990).

Careful planning. Because of the wide range of school and management considerations which need to be addressed, careful planning is essential. Critical considerations include the following:

- Scheduling distance education in coordination with the school or student schedules
- Establishing lines of responsibility
- Selecting and preparing a classroom
- Managing contracts and financial agreements
- Cooperating with other educators
- Managing, obtaining, and repairing equipment
- Recruiting new staff and/or training existing staff
- Managing program change

Defining the role of the classroom coordinator, facilitator, or monitor is also an important part of planning. It is imperative that such roles be defined before program implementation. At the classroom level, plans for monitoring student attendance, discipline, student make-up opportunities, and student assistance need to be developed. In addition, logistics for disseminating materials, obtaining student feedback, and recording student progress need to be an integral part of such plans (Holznagel, 1980; Holznagel, 1991; Moore, et al., 1990).

Barriers

On the downside, research has identified several conditions which impede the implementation of distance education, including:

Costs. Distance education requires changes in curriculum, modes of instruction, and the traditional role of teachers as information providers. Among major barriers to implementation are costs involved in initial capital outlay, staff training, ongoing operation and maintenance, and continuing subscriptions to a delivery system.

Specialized equipment. In addition, lack of specific equipment such as cabling within a school building, lack of fiberoptic cable in rural areas, and lack of steerable satellite equipment are other technical or physical barriers.

Attitude, knowledge, and support. Negative staff attitudes toward change and technology are cited as impeding factors. In addition, educators' lack of knowledge about distance education in general or a lack of technical information on the compatibility among technologies has also hindered program implementation. Finally, a lack of community support for the expenditure on distance education is identified as a barrier (Bramble, 1990; Chow, et al., 1989; Moore, et al., 1990).

Summary

The STEP/Star Program in the Pacific Northwest is an ambitious and multi-faceted undertaking. Since its inception in 1990, the program has continued to evolve as a major driving force in distance education by developing new telecast courses and using emerging technologies in service delivery. For the past six years, it has provided instructional services to the target sites and students in the five-state region and beyond. It has put the needed technical, instructional, and management infrastructure in place to support service delivery, particularly for small rural schools.

In program development, the STEP/Star Program has adopted what extant research has identified as practices which facilitate effective program implementation. For example, in designing new telecast courses, program staff have involved school-level staff as well as experts in the various content areas (Bond, 1987; Bramble, 1990; Hobbs, 1990). The program has made significant resource commitment in terms of expenditure for equipment and staff training (Bramble, 1990; Holznagel, 1990; Willis, 1990). It has sought to create a positive climate of collegial relationships with school-level teachers to facilitate program implementation (Charles, 1989; Drexler, 1992; Loucks-Horsley, 1989; Willis, et al., 1985).

On the negative side, the program has faced similar impeding conditions identified by researchers of distance education, including scheduling difficulties, the need to continually upgrade specialized equipment, ongoing operating and maintenance costs, and staff resistance to change and technology (Bramble, 1990; Holznagel, 1991; Willis, et al., 1985). In addition, perceived disadvantages to learning at a distance and student motivation are other barriers (Martin & Rainey, 1993; Oxford, et al., 1993).

The impeding conditions notwithstanding, STEP/Star service delivery (for both long-existing and newly developed telecast courses) has generally been well received and has resulted in the attainment of most of the desired outcomes as perceived by key stakeholders. Specifically, among the most valued outcomes of distance education are increased opportunities for students, increased staff development opportunities, and lower instructional costs. With the exception of lower instructional costs, the stakeholders

indicate that these outcomes are occurring in schools or districts participating in the STEP/Star Program.

According to key stakeholders, distance education services offered by the STEP/Star Program have had positive impact at the student, school, and community levels. Specifically, the program has (a) increased access to learning opportunities, (b) enhanced the capability of school staff, and (c) strengthened the viability of rural communities.

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